

## Fact Sheet: Orthophosphate, Drinking Water and Public Health

Orthophosphate (OP) is a commonly used corrosion inhibitor that is added to finished drinking water. In addition to its current use in the District of Columbia, OP is being used as a corrosion inhibitor in cities including Richmond, New York City, Denver, and Detroit. OP works by forming a protective coating inside of pipes in the distribution system and in customer homes to prevent lead from leaching into drinking water. Although available in several forms, in the District of Columbia orthophosphate will be added as phosphoric acid. There are several manufacturers of orthophosphate that are certified by NSF International <<http://www.nsf.org>>, an independent testing organization that tests products including drinking water treatment products. In order for a drinking water treatment product to be NSF-certified, it must be a food-grade product.

### *Orthophosphate in drinking water*

The initial dose of OP in the distribution system will be approximately 3 milligrams per liter (mg/L). After an initial application period, the concentration of OP will be stepped down to a maintenance dose of approximately 0.5-1.5 mg/L. **The active ingredient in phosphoric acid is phosphorus.**

### *Phosphorus as an essential nutrient*

Phosphorus is an essential nutrient required for the development of strong bones and teeth, for metabolism of fats and carbohydrates, for protein synthesis, and for synthesis of ATP (an energy storage molecule) by the body. Protein-rich foods, including milk and meats, are excellent sources of phosphorus. The age-dependent recommended dietary intake of phosphorus ranges from 100 mg/day for infants under 1 year old to 1,250 mg/day for children 9-18 years old and pregnant/lactating women younger than 18. The recommendation for adults is 700 mg/day. The orthophosphate addition to D.C. drinking water is expected to add approximately 3 mg/day to most people's diets.

### *Health effects from excess phosphorus*

It is unlikely that adverse health effects will occur at phosphorus intake levels below 70 milligrams per kilogram of body weight per day (mg/kg/day), corresponding to approximately 5,000 mg/day for a 150-pound adult (or 1,400 mg/day for a 40-pound child). The FDA reports that phosphorus intake from food is approximately 300 mg/day; thus, the dose of orthophosphate in D.C. drinking water is expected to increase phosphorus intake by about 1%. The dose of orthophosphate being added is not documented as irritating to the skin or eyes. At very high levels, orthophosphate could cause bone decalcification and increased parathyroid gland activity (due its regulation of the calcium-phosphorus balance in the human body). If you have medical concerns related to additional phosphorus in drinking water, including severe kidney disease or severe calcium regulation dysfunction, consult your physician.

### *Phosphoric acid as a food additive*

Orthophosphate, added as phosphoric acid, is one compound added to control alkalinity/acidity in foods and beverages. Phosphoric acid is generally recognized as safe (GRAS) by the FDA, though its use must conform to good manufacturing practices. The European Union also permits phosphoric acid as a food additive. Phosphoric acid is found in soft drinks (soda), acidified skim

milk, and some cheeses. Cola-type sodas can have 30-48 mg phosphorus per 12-ounce (1 can) serving.

**For more information:**

M.L. Weiner et al. (2001) Toxicological review of inorganic phosphates. *Food and Chemical Toxicology*. **39**: 759-786.

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/237/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/237/description#description)  
ion

National Library of Medicine (NLM) MedlinePlus Encyclopedia Article on “Phosphorus in Diet” <http://www.nlm.nih.gov/medlineplus/ency/article/002424.htm>

NSF Listings: “Drinking Water Treatment Chemicals - Health Effects, October 1, 2003”  
NSF International <http://www.nsf.org>

FDA Investigations Operations Manual, Food Additive Status List [PDF, 61 pages, 337K, About PDF]

[http://www.fda.gov/ora/inspect\\_ref/iom/pdf/AppendixA.pdf](http://www.fda.gov/ora/inspect_ref/iom/pdf/AppendixA.pdf)

FDA Brochure on Food Additives

<http://www.cfsan.fda.gov/%7Elrd/foodaddi.html>

NutritionData.com Search Results for “soda”

<http://www.nutritiondata.com/foods-soda01400000000000000000.html>